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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/785,150	02/24/2004	Xueying Huang	CL2074USNA	8161
23906	7590	11/10/2004	EXAMINER	
E I DU PONT DE NEMOURS AND COMPANY LEGAL PATENT RECORDS CENTER BARLEY MILL PLAZA 25/1128 4417 LANCASTER PIKE WILMINGTON, DE 19805			ZIMMER, MARC S	
			ART UNIT	PAPER NUMBER
			1712	

DATE MAILED: 11/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/785,150

Applicant(s)

HUANG, XUEYING

Examiner

Marc S. Zimmer

Art Unit

1712

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 24 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 28 is/are allowed.
- 6) ☒ Claim(s) 1,6,7,9,11-17,19 and 23-25 is/are rejected.
- 7) ☒ Claim(s) 2-5,10,18,20,21,26 and 27 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 9 and 25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. At issue is Applicant's description of the surface as having a polymer chain density reported in terms of a percentage as it is not clear what the percentage refers to. The examiner can envision at least a couple of possible meanings for this claimed aspect of the invention including (i) between 0.1 and 100% of the total surface area of the substrate is covered with polymer chains, (ii) between 0.1 and 100% of the modifiable groups on the surface of the substrate are reacted with the initiator compound and, in turn, with the macromonomer. (The second interpretation is conceptually similar to the initiator to spacer molecule ratio disclosed in claim 4 if it may be assumed that all surface groups are either reacted with a spacer molecule of the initiating compound.)

It is noted on page 9 of the Specification that chain density is also described as being between  $10^{-5}$  to  $5 \mu\text{mol}/\text{m}^2$ . This would seem to be more consistent with the usual way of reporting a surface density. In any case, clarification is required.

***Claim Analysis***

Applicant is advised that the word "device" (claims 17-25) is not assessed virtually any patentable weight in the absence of more description because the word alone connotes anything that might be used to fulfill a particular role or function and,

hence, could encompass just about any material object. Also, biological resistance will be inherent in any substrate having the polyethylene glycol macromer grafted thereto.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 6, 7, 9, 11-17, 19, and 23-25 rejected under 35 U.S.C. 102(b) as being anticipated by the article entitled "Synthesis of Well-Defined, Polymer-Grafted Silica Particles by Aqueous ATRP" authored by Patten et al. This document discloses atom-transfer radical polymerization as a means of grafting methoxy-capped oligo(ethylene glycol) methacrylate to the surface of a silica particle using 3-(dimethylethoxysilyl)propyl-2-bromo-isobutyrate as an initiator- this initiator corresponds to that which is claimed where  $R^1$  is  $C_2H_5$ ,  $R^2$  and  $R^3$  are  $CH_3$ ,  $R^4$  is  $CH_3$ , and  $R^5$  is  $C_2H_5$ . The process entails preparing a dispersion of silica particles in an aqueous medium and a second aqueous solution comprising the macromonomer, Cu(I) chloride or bromide catalyst, ligand (bipy is shorthand notation for 2,2'-bipyridyl), and initiator, then combining these solutions whereupon an immediate exotherm is indicative of a thermodynamically favorable polymerization. The molecular weight/degree of polymerization of the acryl macromonomer is not defined but, insofar as they are characterized as being oligomeric in nature, they will, by definition, inherently satisfy the structural limitations of the monomer disclosed in step (b) of the claimed process.

Concerning claims 7 and 24, silica is often referred to as a metal oxide in the prior art. See, for instance, paragraph 131 of U.S. Patent Application Publication No. 2004/0156912 which, incidentally teaches an invention that embraces some of the same process limitations present described.

As for claims 9 and 25, the amount of polymer on the surface of the particles is not quantified in this manner. Rather, the reference says only that the polymer content by weight is between 5.37 and 8.2% (see entries 2-4 in Table 1). Given (i) the nearly all-encompassing range recited by these claims and (ii) the relative densities of the polymer and silica, it seems clear that this aspect of the invention is inherently satisfied.

As for claims 13 and 14, Figure 1 shows the preparation of the initiator-bound particles being carried out in ethanol.

#### ***Allowable Subject Matter***

Claims 2-5, 10, 18, 20-21, and 26-27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 28 is allowable. Though 5'(triethoxysilyl)pentyl 2-bromo-2-methylpropionate is merely one of a class of materials known to be effective for atom-transfer polymerizing unsaturated monomers to which the recommended initiator disclosed by the reference also belongs, there is simply no specific motivation to replace the initiator contemplated by Patten with that disclosed in claims 2, 18, and 28. Also, the reference does not teach the modification of the silica particle surface with any other compound other than the initiator/oligo(ethylene glycol).

Klaerner et al., U.S. Patent # 6,692,914 discloses a polymer-modified surface derived from a similar synthetic approach. Moreover, the surfaces, which are to be used in manufacturing biosensors, are modified by grafting thereto ethylene glycol chains and also silane compounds analogous to the spacer compounds of the instant invention. However, whereas the present invention requires the use of a silylalkyl ester of a bromoalkyl acid as the initiator, the initiators disclosed in Klaerner are nitroxide-based. This difference aside, the disclosures are quite similar in many respects.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marc S. Zimmer whose telephone number is 571-272-1096. The examiner can normally be reached on Monday-Friday 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on 571-272-1302. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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